

REPORT OF SUBSURFACE EXPLORATION
AND GEOTECHNICAL EVALUATION
REDSTONE GATEWAY
PHASE 1B
GRAVITY SEWER
HUNTSVILLE, ALABAMA
BUILDING & EARTH PROJECT NUMBER: HV11006

PREPARED FOR:
The City of Huntsville



DATE:
MARCH 18, 2011



Geotechnical, Environmental and Materials Engineers

5545 Derby Drive • Birmingham, AL 35210-5414 • Ph: (205) 836-6300 • Fax: (205) 836-9007
www.BuildingAndEarth.com

March 18, 2011

City of Huntsville
Engineering Division
P.O. Box 308
Huntsville, AL
35804-0308

Attention:

Mr. Chris McNeese
Geotechnical Consultation Services
Redstone Gateway – Gravity Sewer
Huntsville, Alabama
Building & Earth Project # HV11006

Dear Mr. McNeese:

Building & Earth Sciences, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed Redstone Gateway Gravity Sewer at Redstone Arsenal in Huntsville, Alabama. Our services were performed in accordance with our proposals 12114R3 dated June 28, 2010 and 12114 dated February 7, 2011.

The purpose of the exploration and evaluation was to help determine the subsurface conditions at the site. A geotechnical evaluation was performed to determine the potential impact of the subsurface conditions on site preparation for the proposed development. The recommendations in this report are based on observation and classification of samples obtained from twenty one (21) soil test borings.

We appreciate the opportunity to provide consultation services for your project. If you have any questions regarding the information in this report or need any additional information, please do not hesitate to contact us.

Respectfully submitted,

BUILDING & EARTH SCIENCES, INC.


Don Brown, P.E.
Project Manager



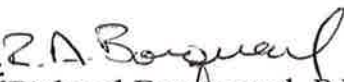

Richard Boutquard, P.E.
Senior Geotechnical Engineer

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1.0 PROJECT / SITE DESCRIPTION

This report addresses installation of gravity sewers for the Redstone Gateway project at the Redstone Arsenal in Huntsville, Alabama. The project site is located south of I-565, north of Overlook Road, and west of Rideout Road. According to the project plans dated June 20, 2010, provided by LBYD, Inc., the development will consist of multiple buildings and retail stores. Boulevard A will act as the primary transportation corridor throughout the site.

The site is primarily open pastureland and is presently grass covered. Wooded areas are located to the north near I-565 and near Overlook Road to the south. Currently the site is bisected by an abandoned railroad spur running north to south. To the west of the railroad is a power sub-station and to the east is the Redstone Arsenal Welcome and Visitors Center.

2.0 SCOPE OF SERVICES

The recommendations and findings presented in this report are based upon observation of soil samples obtained within the proposed Redstone EUL sanitary sewer alignment. Fifteen (15) site borings were drilled from October 15 to 19, 2010 and five (6) site borings were drilled on March 4, 2011.

The approximate boring locations are depicted on the Boring Location Plan in the Appendix of this report. The field data and results of the laboratory tests are summarized in this report and include the following:

- Site geology and potential impact on the site development.
- A description of the subsurface conditions encountered at the soil boring locations.
- Presentation of laboratory test results.
- A description of the groundwater conditions observed in the boreholes during drilling. Long-term monitoring was not included in our scope of work.
- Site preparation considerations including suitability of materials at the site for use as structural fill and treatment of unsuitable soils, if encountered.

The scope of services did not include an environmental site assessment or evaluation of potential wetland areas. Any mention of unusual odors or materials on the boring logs or in the report is provided for the client's information only.

3.0 SITE GEOLOGY

According to the Geologic map of Alabama (Special Map 220), the subject is underlain by the Tuscumbia Formation, which is a part of the Interior Low Plateaus physiographic section. The bedrock associated with the Tuscumbia consists of light gray limestone with chert nodules. The rock weathers to a moderately to highly plastic clay with occasional chert.

Since the Tuscumbia is primarily a carbonate rock, it is subject to dissolution along both joints and bedding planes. The dissolution process tends to initially form vertical slots in the limestone. The overlying residual soil can be eroded downward into these vertical slots which subsequently become filled with soft, wet soils. As a result of the physical and chemical weathering process, the bedrock surface is typically highly variable, with relatively hard blocks (or boulders) and pinnacles separated by soil-filled slots. Sinkholes are common in the Tuscumbia Formation due to solution cavities and zones of fracturing associated with the bedrock.

4.0 SUBSURFACE EXPLORATION

The subsurface exploration was performed on October 15 through 19, 2010 and March 4, 2011. All of the site test borings were accessible to the truck-mounted drill rig.

The boring locations were located in the field utilizing GPS coordinates derived from project plans supplied by LBYD Inc. The approximate locations drilled are shown on the Boring Location Plan included in the Appendix of this report.

At each boring location, soil samples were obtained at standard sampling intervals by driving a split-spoon sampler. The borehole was first advanced to the sample depth by auguring, and the sampling tools were placed in the open hole. The sampler was then driven 18 inches into the ground with a 140-pound hammer free falling 30 inches. The number of blows required to drive the sampler each 6 inch increment was recorded. The initial increment is considered the "seating" blows, where the sampler penetrates loose or disturbed soil in the bottom of the borehole. The blows required to penetrate the final two (2) increments were added together and are referred to as the Standard Penetration Test (SPT) N-Value. The N-Value, when properly evaluated, gives an indication of the soil's strength and ability to support structural loads. Many factors can affect the SPT N-Value, so this result cannot be used exclusively to evaluate soil conditions. SPT testing was done in general accordance with ASTM D-1586.

The samples retrieved from the split-spoon sampler were placed in plastic bags, labeled, and transported to our laboratory. The project engineer then visually classified the samples and prepared Boring Logs to summarize the subsurface conditions at each borehole location. The Boring Logs are included in this report. A box within an "x" in the "Sample Type" column of the attached Boring Logs indicates the depths at which the split-spoon samples were obtained. All of the boreholes were backfilled at the completion of field testing.

5.0 LABORATORY ANALYSES

After the soil samples were visually classified, representative samples were selected by the project engineer for laboratory analysis. The laboratory analysis for the investigation included three (3) Atterberg Limits tests and twenty-four (24) natural moisture content determinations.

5.1 DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D 2488)

The soil samples were visually examined by our engineer and soil descriptions were provided. Representative samples were then selected and tested in accordance with the aforementioned laboratory-testing program to determine soil classifications and engineering properties. This data was used to correlate our visual descriptions with the Unified Soil Classification System (USCS).

5.2 NATURAL MOISTURE CONTENT (ASTM D 2216)

Natural moisture contents (M %) was determined on selected samples. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles. The results are indicated on the attached Boring Logs.

5.3 ATTERBERG LIMITS (ASTM D-4318)

Atterberg Limits tests were performed to evaluate the soil's plasticity characteristics. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid. The Plastic Limit is the moisture content at which the soil is between "plastic" and the semi-solid stage. The results of these tests are presented on the boring logs in the Appendix. The Plasticity Index ($PI = LL - PL$) is a frequently used indicator for a soil's potential for volume change. Typically, a soil's potential for volume change increases with higher plasticity indices.

5.4 POCKET PENETROMETER

Pocket Penetrometer (P.P.) tests were performed on cohesive soil samples. The pocket penetrometer provides a consistency classification, and an indication of the soil's unconfined compressive strength. The pocket penetrometer data are presented in the attached Boring Logs.

6.0 GEOTECHNICAL SITE CHARACTERISTICS

The subsurface conditions at the site were evaluated by observing and classifying soil samples obtained from the soil test borings. The conditions between the boreholes are assumed to be similar to the conditions encountered at the borehole locations. The following discussion regarding subsurface conditions and the subsequent recommendations are based on the supposition that no significant changes in subsurface condition occur between boreholes. The presumed conditions should be verified during site preparation and foundation installation.

6.1 SURFACE CONDITIONS

The site is relatively level and was accessible to our truck mounted drilling equipment. Vegetation at the site primarily consisted of pasture grass with few wooded areas. Topsoil, generally less than 6 inches thick, was observed at the boring locations. Note that some localized zones of deeper topsoil may be encountered. Also, the subject area has been cultivated in the past so a deeper zone of roots and organics may be present.

6.2 RESIDUAL SOILS

Residual materials are formed by the in-place weathering of the parent bedrock. Residual soils were encountered below the existing topsoil and continued to termination depth in each boring. The soils encountered within the test locations generally consisted of an upper and lower stratum.

The residual soil in the upper stratum primarily consisted of moderately plastic, yellowish-brown, lean sandy clay (CL/CH). The upper zone was typically between 3 and 5 feet thick. Based on SPT N-values and pocket penetrometer tests, the overall consistency of the residual soil encountered within the upper stratum was classified as very stiff. The lower stratum generally consisted of fat clay (CH). Based on SPT N-values and pocket penetrometer tests, the overall consistency of the residual soil encountered within the lower stratum upper zone was classified as stiff to very stiff. The pipe invert elevations for each test location are depicted on the test logs within the appendix of this report. Within most test locations, the pipe will be bearing on very stiff fat clay or on rock.

The results of the laboratory tests performed during this investigation are presented below.

BORING LOCATION	SAMPLE DEPTH (FT)	LL	PL	PI	MOISTURE CONTENT (%)	USCS
SS-1	3.5-5.0	51	27	24	24.3	CH
SS-1	6.0-7.5	-	-	-	27	-
SS-2	3.5-5.0	-	-	-	27	-
SS-2	8.5-10.0	-	-	-	27.3	-
SS-3	3.5-5.0	-	-	-	24.2	-
SS-3	13.5-15.0	-	-	-	28.4	-
SS-4	3.5-5.0	-	-	-	25.2	-
SS-4	8.5-10.0	-	-	-	29.7	-
SS-5	6.0-7.5	-	-	-	23.3	-
SS-5	8.5-10.0	-	-	-	26.3	-
SS-6	3.5-5.0	-	-	-	25.1	-
SS-6	8.5-10.0	-	-	-	30.7	-
SS-7	1.0-2.5	-	-	-	24.3	-
SS-7	3.5-5.0	57	25	32	31.4	CH
SS-8	6.0-7.5	-	-	-	25.8	-
SS-8	8.5-10.0	-	-	-	37.5	-
SS-9	3.5-5.0	-	-	-	28.3	-
SS-9	8.5-10.0	-	-	-	25.9	-
SS-10	6.0-7.5	-	-	-	16.3	-
SS-10	8.5-10.0	64	28	36	34.6	CH
SS-11	3.5-5.0	-	-	-	21.9	-
SS-11	8.5-10.0	-	-	-	34.1	-
SS-12	3.5-5.0	-	-	-	20.3	-
SS-12	6.0-7.5	-	-	-	22.9	-
SS-16	1.0-2.5	-	-	-	26.1	-
SS-16	3.5-5.0	-	-	-	19.7	-
SS-16	6.0-7.5	-	-	-	20.5	-
SS-16	8.5-10.0	-	-	-	32.6	-
SS-16	18.5-20.0	-	-	-	32.3	-
SS-17	1.0-2.5	-	-	-	28.0	-
SS-17	3.5-5.0	-	-	-	32.1	-
SS-17	6.0-7.5	-	-	-	33.6	-
SS-17	8.5-10.0	-	-	-	28.4	-
SS-17	13.5-15.0	-	-	-	31.6	-
SS-18	1.0-2.5	-	-	-	24.6	-
SS-18	3.5-5.0	-	-	-	31.8	-

SS-18	6.0-7.5	-	-	-	32.5	-
SS-19	1.0-2.5	-	-	-	25.0	-
SS-19	3.5-5.0	61	26	35	35.1	CH
SS-19	6.0-7.5	-	-	-	31.8	-
SS-19	8.5-10.0	-	-	-	36.1	-
SS-20	1.0-2.5	-	-	-	23.9	-
SS-20	3.5-5.0	-	-	-	31.4	-
SS-20	6.0-7.5	-	-	-	26.9	-
SS-20	8.5-10.0	-	-	-	34.3	-

6.3 GROUNDWATER IN THE BOREHOLES

Groundwater was encountered within Boring SS-18 at 35 feet at the time of drilling. This depth corresponds to an elevation of 590.5. The borings were backfilled at completion of excavation. Please note that short-term water level readings are not necessarily an accurate indication of the actual groundwater level. The presence or absence of water in boreholes can be affected by the prevalent weather conditions prior to and during the field exploration.

A standpipe piezometer was installed at boring SS-16. We will perform water elevation monitoring at this location for an extended duration. The results of this monitoring will be provided to you.

6.4 AUGER REFUSAL

Auger refusal is the drilling depth at which the borehole can no longer be advanced using the current drilling procedure. Auger refusal may occur on boulders, chert beds, or the upper bedrock surface. Note should be taken of borings SS-19, SS-20 and SS-21 which encountered refusal at relatively high elevation. The following table lists auger refusal depths encountered:

Boring Number	Auger Refusal Depth (FT)	Elevation (MSL Ft)
SS-16	38.0	587.0
SS-17	40.0	584.6
SS-18	39.0	586.9
SS-19	17.5	607.5
SS-20	16.0	609.0
SS-21	21.0	613.6

Table 2: Auger Refusal Depths

6.5 TEMPORARY EXCAVATIONS

For pipe excavations Occupational Safety & Health Administration (OSHA 29 CFR Part 1926 Subpart P) guidelines should be utilized. Within the test locations of this report pipe invert depths should be referenced to determine soil types and conditions expected to be encountered.

6.6 CONDUCTIVITY AND pH (ASTM G57)

Two Resistivity and pH tests were performed during a previous investigation at Redstone Gateway. The results indicated a pH less than 7 and so are considered acidic. The following are the results of this testing.

SAMPLE	DEPTH (FT)	pH	RESISTIVITY (OHM/CM)
A	3.5 – 5.0	5.8	427,000
B	3.5-5.0	6.1	529,000

Although the tested soils are moderately acidic, the high resistivity values indicate that the soils essentially non-corrosive. The *Handbook of Steel Drainage & Highway Construction Products*, John C. Barnett, Sr. (1971) indicates that the on-site materials would be virtually non-aggressive to steel.

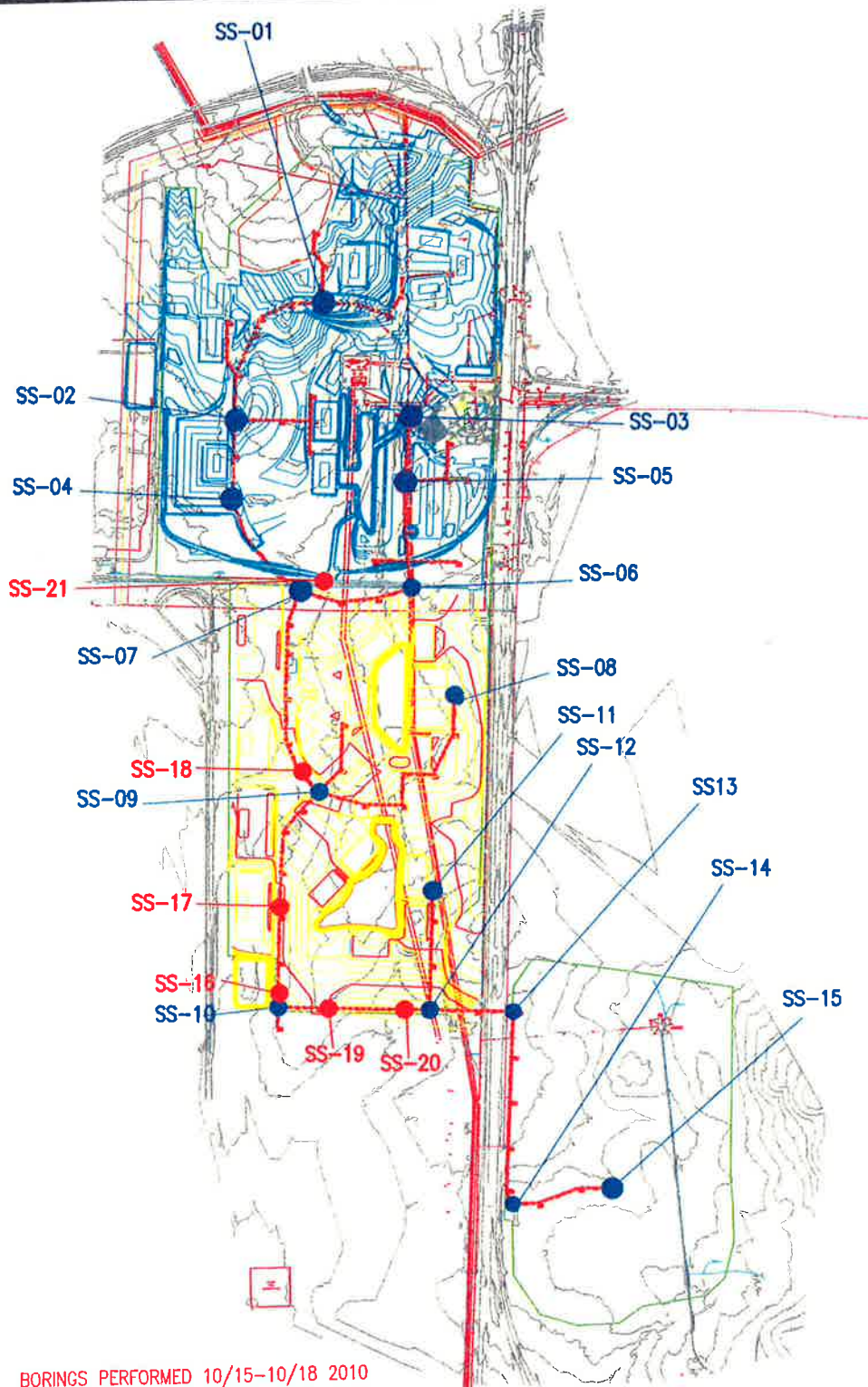
7.0 CONSTRUCTION MONITORING

The recommendations presented in this report are based on information obtained from twenty one (21) soil test borings. Field verification of site conditions is an essential part of the services provided by the geotechnical consultant. To confirm the recommendations included herein, a geotechnical engineer should make periodic visits to the site during site during pipe trench excavation.

8.0 CLOSING

This report was prepared for the exclusive use of the City of Huntsville, for specific application to the subject site at the Redstone Arsenal in Huntsville, Alabama. The information in this report is not transferable. This report should not be used for a different development on the same property without first being evaluated by the engineer. The recommendations in this report were based on the information obtained from the field exploration, laboratory analysis, and engineering judgment regarding conditions between borings. The anticipated subsurface conditions should be confirmed during site grading and foundation installation.

This report is intended for use during design and preparation of specifications, and it may not address all conditions at the site at the time of construction. Contractors reviewing this information should acknowledge that this document is for design information only.



Reference used to
produce this drawing :

BORING LOCATION PLAN

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LBVD Drawing

**PROJECT
NO:**

HV11006

PROJECT NAME / LOCATION:

Redstone Gateway Sewer
Huntsville, AL

SCALE:

NTS

DATE:

3/18/11

BUILDING & EARTH SCIENCES, INC.

BORING LOG DESCRIPTION

Building & Earth Sciences, Inc. uses the gINT software program to prepare the attached boring logs. The gINT program provides the flexibility to custom design the boring logs to include the pertinent information from the subsurface exploration and results of our laboratory analysis. The soil and laboratory information included on our logs is summarized below:

Depth

The depth below the ground surface is shown.

Sample Type

The method used to collect the sample is shown. The typical sampling methods include Split Spoon Sampling, Shelby Tube Sampling, Grab Samples, and Rock Core. A key is provided at the bottom of the log showing the graphic symbol for each sample type.

Sample Number

Each sample collected is numbered sequentially

Blows per 6", REC%, RQD%

When Standard Split Spoon sampling is used, the blows required to drive the sampler each 6-inch increment are recorded and shown in column 4. When rock core is obtained the recovery ration (REC%) and Rock Quality Designation (RQD%) is recorded.

Soil Data

Column 5 is a graphic representation of 4 different soil parameters. Each of the parameters use the same graph, however, the values of the graph subdivisions vary with each parameter. Each parameter presented on column 5 is summarized below:

- **N-Value**- The Standard Penetration Test N-Value, obtained by adding number of blows required to drive the sampler the final 12 inches, is recorded. The graph labels range from 0 to 50.
- **Qu** – Unconfined Compressive Strength estimate from the Pocket Penetrometer test in tons per square foot (tsf). The graph labels range from 0 to 5 tsf.
- **Atterberg Limits** – The Atterberg Limits are plotted with the plastic limit to the left, and liquid limit to the right, connected by a horizontal line. The difference in the plastic and liquid limits is referred to as the Plasticity Index. The Atterberg Limits test results are also included in the Notes column on the far right column of the boring log. The Atterberg Limits graph labels range from 0 to 100.
- **% Moisture** – The Natural Moisture Content of the soil sample as determined in our laboratory.

Soil Description

The soil description prepared in accordance with ASTM D 2488, Visual Description of Soil Samples. The Munsel Color chart is used to determine the soil color. Strata changes are indicated by a solid line, with the depth of the change indicated on the left side of the line. If subtle changes within a soil type occur, a broken line is used. The Boring Termination or Auger Refusal depth is shown as a solid line at the bottom of the boring.






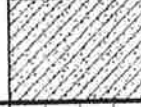

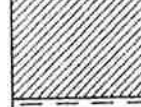
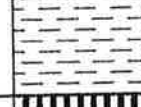




Graphic

The graphic representation of the soil type is shown. The graphic used for each soil type is related to the Unified Soil Classification chart. A chart showing the graphic associated with each soil classification is included.

Remarks

Remarks regarding borehole observations, and additional information regarding the laboratory results and groundwater observations.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-01

Sheet 1 of 1

Office:

Fax:

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Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 24A

Project Location: Huntsville, AL

Date Drilled: 10/15/10

Weather Conditions:

Surface Elevation: 658

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY LEAN CLAY (CL): very stiff, dark yellowish-brown, with traces of root fibers, dry

3.5

654.5

Sample #2

Liquid Limit (LL) = 51

Plastic Limit (PL) = 27

Plasticity Index (PI) = 24

LEAN TO FAT CLAY (CH): very stiff, reddish-brown, with traces of sand size black nodules, dry

stiff

with traces of sand size chert fragments, slightly moist

13.0

(RESIDUAL) 645.0

FAT CLAY (CH): very stiff, yellowish-brown, with sand and gravel size chert fragments, wet

15.0

643.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling

Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESJ GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-03

Sheet 1 of 1

Office:

Fax:

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Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 8B

Project Location: Huntsville, AL

Date Drilled: 10/15/10

Weather Conditions:

Surface Elevation: 636

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

No Retrieval - 1 foot of stone

3.0 633.0

LEAN CLAY (CL): very stiff, dark brown, moist

5.0 (POSSIBLE TOPSOIL) 631.0

LEAN CLAY (CL): stiff, brown, with traces of black, moist

dark brown to yellowish-brown

13.0 623.0

FAT CLAY (CH): very stiff, light yellowish-brown, with few sand and gravel size chert fragments, moist

15.0 (RESIDUAL) 621.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling
Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESIGDT 3/18/11



Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-04

Sheet 1 of 1

Office:

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Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 17A

Project Location: Huntsville, AL

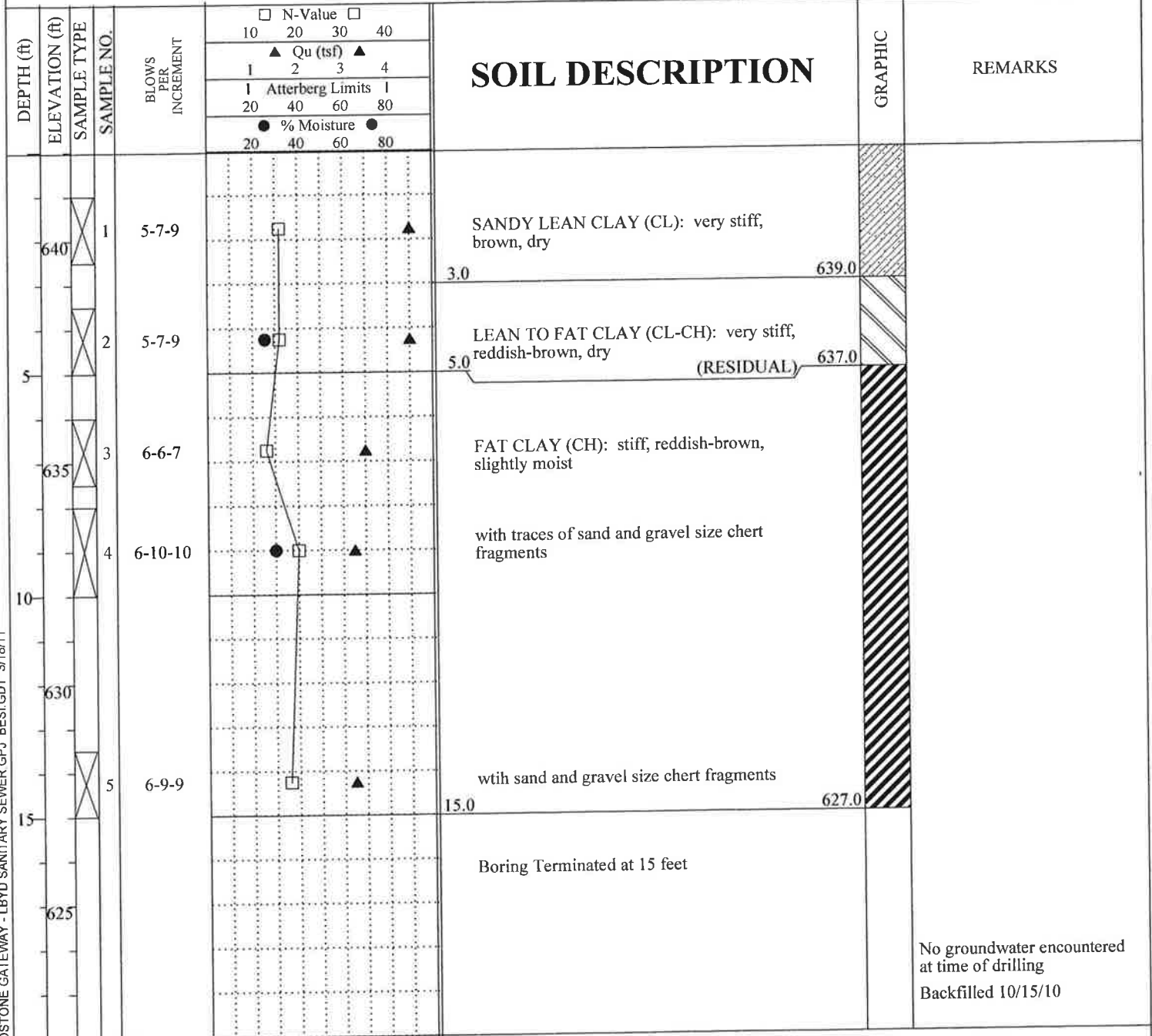
Date Drilled: 10/15/10

Weather Conditions:

Surface Elevation: 642

Drill Crew:

Logged By:



SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-05

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 6B

Project Location: Huntsville, AL

Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 641

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

No Retrieval - approximately 1.5 feet of rock

3.5 637.5

LEAN TO FAT CLAY (CL-CH): firm, reddish-brown, slightly moist

5.0 (RESIDUAL) 636.0

FAT CLAY (CH): firm, reddish-brown, with traces of sand size chert fragments, slightly moist

stiff, light yellowish to reddish-brown, moist

15.0 yellowish to reddish-brown and gray, with traces of sand and gravel size chert fragments 626.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling
Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-06

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 3B

Project Location: Huntsville, AL

Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 645

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY CLAY (CL): very stiff, reddish-brown, with traces of root fibers, dry

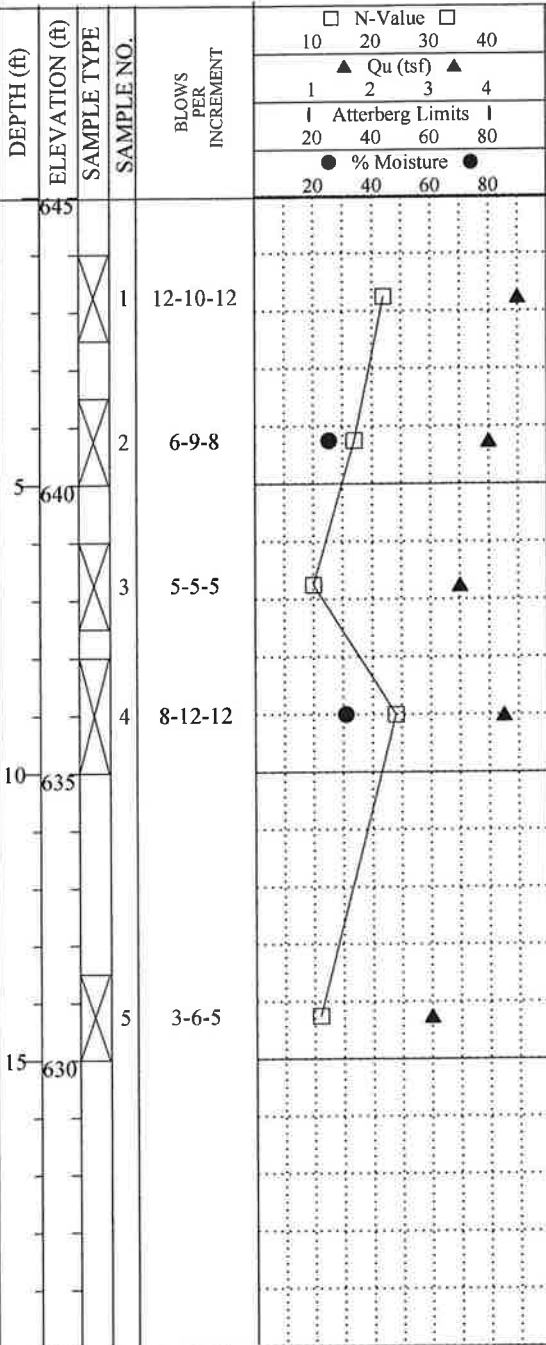
LEAN TO FAT CLAY (CL-CH): very stiff, reddish-brown, slightly moist

FAT CLAY (CH): very stiff, dark yellowish to reddish-brown, with traces of sand and gravel size chert fragments, slightly moist

stiff, light yellowish to reddish-brown and gray, moist

Boring Terminated at 15 feet

No groundwater encountered at time of drilling
Backfilled 10/15/10



SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)
% MOISTURE PERCENT NATURAL MOISTURE CONTENT
☒ GROUNDWATER LEVEL IN THE BOREHOLE
Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY
RQD ROCK QUALITY DESIGNATION
UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BES/GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-07

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 14A

Project Location: Huntsville, AL

Date Drilled: 10/15/10

Weather Conditions:

Surface Elevation: 634

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY LEAN CLAY (CL): very stiff, reddish-brown, dry

3.0

631.0

FAT CLAY (CH): stiff, dark yellowish-brown, slightly moist

very stiff, yellowish to reddish-brown, with traces of sand size chert fragments

stiff, light yellowish to reddish-brown

very stiff

15.0

(RESIDUAL) 619.0

Boring Terminate at 15 feet

Sample #2
Liquid Limit (LL) = 57
Plastic Limit (PL) = 25
Plasticity Index (PI) = 32

No groundwater encountered at time of drilling
Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESJ GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-08

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 6K

Project Location: Huntsville, AL

Date Drilled: 10/19/10

Weather Conditions:

Surface Elevation: 642

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY LEAN CLAY (CL): very stiff, reddish-brown, with traces of root fibers, dry

3.0

639.0

LEAN TO FAT CLAY (CL-CH): stiff, reddish-brown, slightly moist

very stiff

8.0

(RESIDUAL)

634.0

FAT CLAY (CH): stiff, reddish-brown, with traces of sand size chert fragments, slightly moist

very stiff, light yellowish to reddish-brown, with traces of sand and gravel size chert fragments, moist

15.0

627.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling

Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BES| GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-09

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 8A

Project Location: Huntsville, AL

Date Drilled: 10/19/10

Weather Conditions:

Surface Elevation: 627

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY LEAN CLAY (CL): very stiff, brown, with traces of root fibers, dry

3.0

624.0

LEAN TO FAT CLAY (CL-CH): very stiff, dark yellowish-brown, with traces of sand size chert fragments, slightly moist

very stiff, yellowish-to reddish-brown

no chert fragments

13.0

(RESIDUAL)

614.0

FAT CLAY (CH): very stiff, dark yellowish-brown, with few sand and gravel size chert fragments, slightly moist

15.0

612.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling
Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-10

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 2A

Project Location: Huntsville, AL

Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 624

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY LEAN CLAY (CL): very stiff, reddish-brown, dry

3.0

621.0

LEAN TO FAT CLAY (CL-CH): very stiff, yellowish and reddish-brown, slightly moist

8.0

(RESIDUAL)

616.0

FAT CLAY (CH): very stiff, light yellowish-brown, with few sand and gravel size rock fragments, slightly moist

15.0

609.0

Boring Terminated at 15 feet

Sample #4

Liquid Limit (LL) = 64

Plastic Limit (PL) = 28

Plasticity Index (PI) = 36

No groundwater encountered at time of drilling

Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

UD GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESJ GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-11

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 3M

Project Location: Huntsville, AL

Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 632

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

LEAN CLAY (CL): stiff, reddish-brown, with black nodules, slightly moist

very stiff

8.0 (RESIDUAL) 624.0

FAT CLAY (CH): very stiff, dark yellowish-brown, with sand and gravel size chert fragments, slightly moist

yellowish to reddish-brown

15.0 617.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling
Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESJ GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-13

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 6L

Project Location: Huntsville, AL

Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 629

Drill Crew:

Logged By:

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	<div> <div> <div>□ N-Value □</div> <div>10 20 30 40</div> </div> <div> <div>▲ Qu (tsf) ▲</div> <div>1 2 3 4</div> </div> <div> <div> Atterberg Limits </div> <div>20 40 60 80</div> </div> <div> <div>● % Moisture ●</div> <div>20 40 60 80</div> </div> </div>	SOIL DESCRIPTION	GRAPHIC	REMARKS
			1	8-9-9		SANDY LEAN CLAY (CL): very stiff, brown, dry		
	625		2	8-8-10		LEAN TO FAT CLAY (CL-CH): very stiff, yellowish-brown, with traces of sand size chert fragments and black nodules, slightly moist		
5			3	7-7-8		FAT CLAY (CH): very stiff, light yellowish to reddish-brown, slightly moist		
	620		4	5-8-10		with traces of sand size chert fragments		
10			5	6-9-10		light yellowish-brown to reddish-brown and gray, moist		
15	615					Boring Terminated at 15 feet		
	610							No groundwater encountered at time of drilling Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-14

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH# 11L

Project Location: Huntsville, AL

Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 629

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SANDY LEAN CLAY (CL): very stiff, reddish-brown, dry

3.0

626.0

FAT CLAY (CH): stiff, reddish-brown, with traces of sand and gravel size chert fragments, slightly moist

very stiff, yellowish to reddish-brown

15.0

(RESIDUAL) 614.0

Boring Terminated at 15 feet

No groundwater encountered at time of drilling

Backfilled 10/15/10

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-15

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway - LBYD Sanitary Sewer

Project Number: HV10019

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location: MH#14L

Project Location: Huntsville, AL

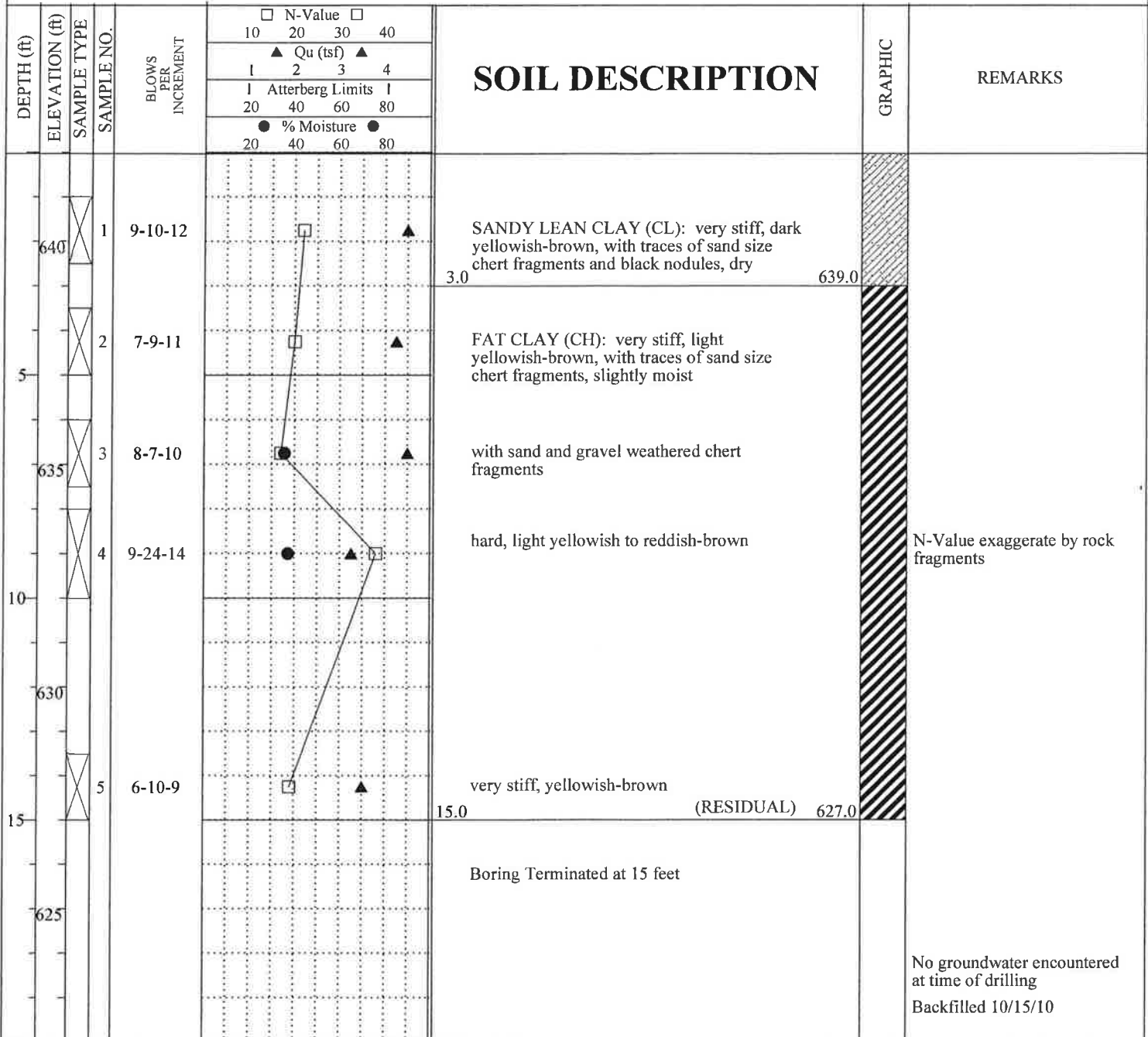
Date Drilled: 10/18/10

Weather Conditions:

Surface Elevation: 642

Drill Crew:

Logged By:



SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

No groundwater encountered at time of drilling
Backfilled 10/15/10

LOG OF BORING 2 REDSTONE GATEWAY - LBYD SANITARY SEWER GPJ BESJ GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-16

Sheet 1 of 2

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 625

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value	Qu (tsf)	Atterberg Limits	% Moisture
					10 20 30 40	1 2 3 4	20 40 60 80	20 40 60 80
625		X	1	3-6-7				
		X	2	3-5-9				
620		X	3	4-5-7				
		X	4	10-10-12				
615		X	5	9-18-9				
610		X	6	4-6-7				
605		X						

SILTY CLAY (CL): stiff, red, slightly moist

stiff, brown, slightly moist

very stiff, with chert

stiff, with chert

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

▽ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-16

Sheet 2 of 2

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 625

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	<div> <input type="checkbox"/> N-Value <input type="checkbox"/> </div> <div> 10 20 30 40 </div> <div> <input type="checkbox"/> Qu (tsf) <input type="checkbox"/> </div> <div> 1 2 3 4 </div> <div> Atterberg Limits </div> <div> 20 40 60 80 </div> <div> <input type="checkbox"/> % Moisture <input type="checkbox"/> </div> <div> 20 40 60 80 </div>
60.0					
59.5					
59.0					
58.5					
58.0					

38.0

587.0

Auger Refusal at 38 feet

No groundwater encountered at time of boring

Backfilled 3/4/11

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-17

Sheet 1 of 2

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 624.6

Drill Crew:

Logged By:

SOIL DESCRIPTION

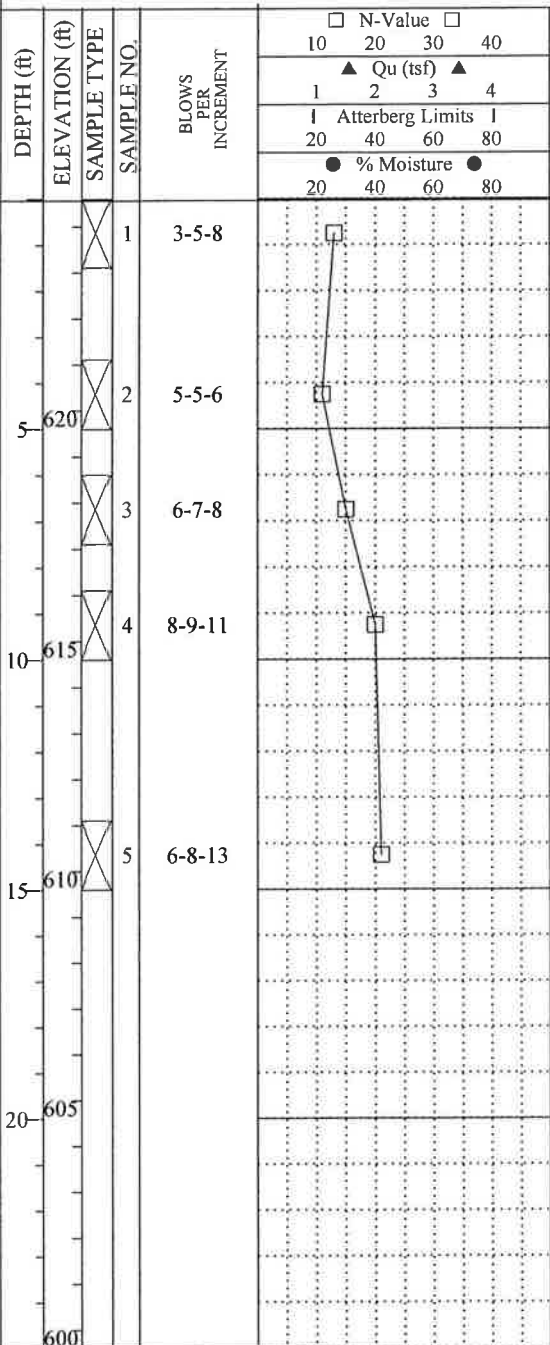
GRAPHIC

REMARKS

SILTY CLAY (CL): stiff, red, slightly moist

very stiff, brown, slightly moist

very stiff, with chert



SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

▽ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-17

Sheet 2 of 2

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 624.6

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	<div> <input type="checkbox"/> N-Value <input type="checkbox"/> </div> <div> 10 20 30 40 </div> <div> <input type="checkbox"/> Qu (tsf) <input type="checkbox"/> </div> <div> 1 2 3 4 </div> <div> Atterberg Limits </div> <div> 20 40 60 80 </div> <div> <input type="checkbox"/> % Moisture <input type="checkbox"/> </div> <div> 20 40 60 80 </div>
30	595				
35	590				
40	585				
45	580				
50	575				

40.0

584.6

Auger Refusal at 40 feet

No groundwater encountered at time of boring

Backfilled 3/4/11

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESIGDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-18

Sheet 1 of 2

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 625.9

Drill Crew:

Logged By:

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	<div> <input type="checkbox"/> N-Value <input type="checkbox"/> Qu (tsf) </div> <div> 10 20 30 40 </div> <div> <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 </div> <div> Atterberg Limits </div> <div> 20 40 60 80 </div> <div> <input type="checkbox"/> % Moisture <input type="checkbox"/> </div> <div> 20 40 60 80 </div>	SOIL DESCRIPTION	GRAPHIC	REMARKS
625		X	1	3-3-3	<input type="checkbox"/>	SILTY CLAY (CL): firm, brown, slightly moist		
		X	2	3-3-4	<input type="checkbox"/>			
5		X	3	5-7-8	<input type="checkbox"/>	very stiff, with chert, slightly moist		
620		X	4	8-11-15	<input type="checkbox"/>			
		X						
615		X						
		X						
15		X						
610		X						
		X						
20		X						
605		X						

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☐ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESJ GDT 3/18/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-19

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 625

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SILTY CLAY (CL): stiff, red, slightly moist

brownish-yellow, slightly moist

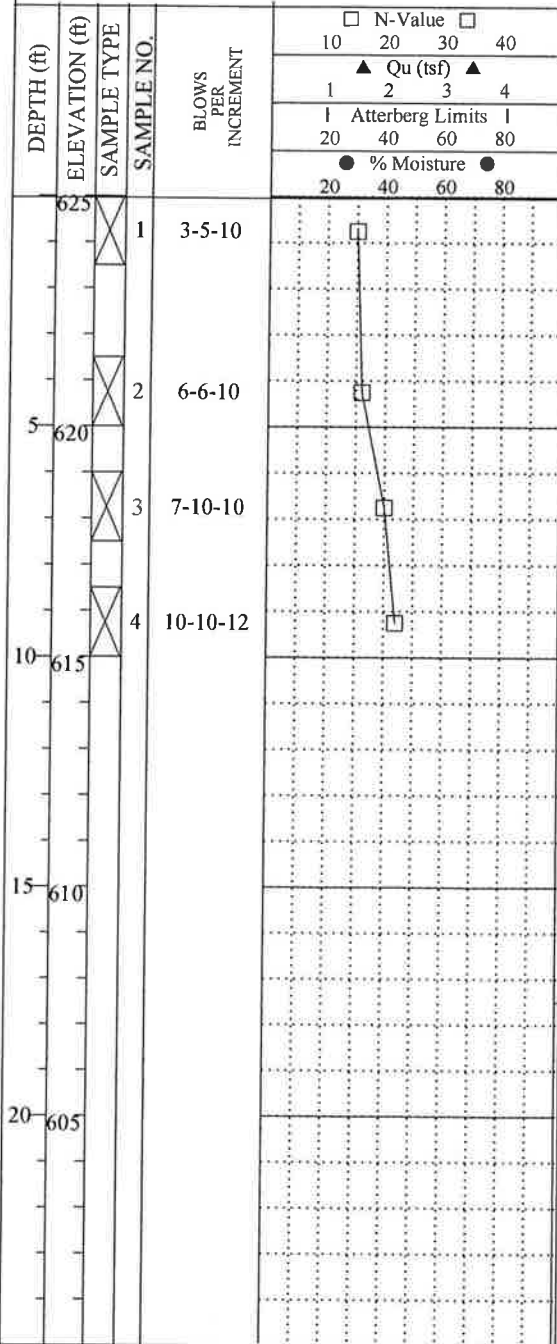
brownish-yellow, with chert, slightly moist

Auger Refusal at 17.5 feet

No groundwater encountered at time of boring

Backfilled 3/4/11

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESIGDT 3/18/11



SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

UD GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-20

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 625

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SILTY CLAY (CL): very stiff, brown, slightly moist

stiff, brownish-yellow, with chert, slightly moist

very stiff, brownish-yellow, with chert, slightly moist

hard, brownish-yellow, with chert, slightly moist

16.0
Auger Refusal at 16 feet

609.0

No groundwater encountered at time of boring

Backfilled 3/4/11

SAMPLE TYPE ☒ Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESIGDT 3/16/11

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: SS-21

Sheet 1 of 1

Office:

Fax:

www.BuildingAndEarth.com

Project Name: Redstone Gateway Sewer

Project Number: HV11006

Drilling Method: Hollow Stem Auger

Equipment Used:

Hammer Type:

Boring Location:

Project Location: Huntsville, AL

Date Drilled: 3/4/11

Weather Conditions:

Surface Elevation: 624.6

Drill Crew:

Logged By:

SOIL DESCRIPTION

GRAPHIC

REMARKS

SILTY CLAY (CL): red, slightly moist

Auger Only

21.0

603.6

Auger Refusal at 21 feet

Chert

No groundwater encountered at time of boring

Backfilled 3/4/11

SAMPLE TYPE ☒ Auger Cuttings

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)

% MOISTURE PERCENT NATURAL MOISTURE CONTENT

☒ GROUNDWATER LEVEL IN THE BOREHOLE

Qu UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST

REC RECOVERY

RQD ROCK QUALITY DESIGNATION

UD UNDISTURBED

LOG OF BORING 2 REDSTONE GATEWAY SEWER GPJ BESJ GDT 3/18/11